

# On Shaky Ground

A number of big earthquakes rocked the world in 2011. That has people asking—should we expect even more rumbling this year?

Last March, a major earthquake off the northeast coast of Japan made headlines around the world. The quake triggered a tsunami in the Pacific Ocean. The giant ocean waves killed more than 15,000 people and caused massive destruction. In October, another powerful quake rocked Turkey, killing more than 600 people and destroying thousands of buildings.

Closer to home, a rare quake rattled much of the East Coast of the U.S. on August 23. It was the strongest quake to hit the area in more than a century.

Millions of earthquakes occur around the world every year. Most are so small that we

don't even feel them. But these recent large—or unusual—earthquakes have many people wondering whether we can expect even more in 2012.

## Great Plates

To understand how earthquakes occur, it helps to think of Earth's crust as a giant jigsaw puzzle. The

“puzzle pieces” are huge slabs of rock called tectonic plates (see map below). The plates are in constant motion. As they shift, they may **diverge**, collide into, or slide against one another. But the movement is usually so slow that we don't feel it. Plates normally move about as fast as your fingernails grow.



SOURCE: U.S. Geological Survey



## Words to Know

**diverge** (dih-vurhj) *verb.* to move apart from

**seismologist** (size-mah-luh-jist) *noun.* a scientist who studies earthquakes





**November: A damaged home in Oklahoma**

Sometimes, pressure builds up along the edges of plates. When the pressure becomes too great, the huge slabs of rock may suddenly slip or break. That produces the sudden, violent shaking we call an earthquake.

Like most big quakes, the ones that rocked Japan and Turkey in 2011 occurred along plate edges. And both were extremely powerful. The earthquake in Japan had a magnitude of 9.0 (*see "Measuring Quakes"*). The quake in Turkey was also a big one, at 7.1. But experts say there isn't a connection between big quakes that take place so far apart.

"We just don't believe that . . . large earthquakes can be triggered by other large earthquakes at those distances," says Robert Williams, a **seismologist** with the United States Geological Survey.

## Cluster of Quakes

It's no surprise that most big earthquakes in the U.S. occur along the West Coast—that's where two major plates meet. But last year, sizable tremors rattled areas far from plate edges. On August 23, people from Georgia to southeastern Canada felt the rumble of a 5.8 magnitude quake that was centered in Virginia. The same day, Colorado was shaken by a 5.3 magnitude earthquake—its biggest in decades. Then in

November, Oklahoma was rocked by the largest quake in its history. Arkansas also saw an increase in earthquake activity last year.

What does all the unusual activity mean? Most experts say it's just part of Earth's natural cycle and that

earthquakes can occur anytime, anywhere. "The process [that causes] earthquakes around the world . . . has ups and downs," Williams says.

The quakes that shook up the U.S. in 2011, he says, are not a sign of things to come.

## More to Explore

Still, seismologists admit that they have a lot to learn about earthquakes. They can't predict or prevent them. And they don't yet have a good understanding about the stresses that build up far from tectonic plate edges. But now they are paying closer attention to areas of the U.S. that had more quake activity last year. Currently, researchers in Georgia and other eastern states are placing instruments under Earth's surface. They hope to learn more about what causes earthquakes in these regions and help keep people safe.

—Natalie Smith



**August: A grocery store in Virginia**

# Measuring Quakes

**Seismologists measure earthquakes by magnitude—the amount of energy they release. They are measured on a scale that goes from 1 to 10. Quakes with the highest magnitudes are the rarest—and most destructive.**

## 1-2 MICROEARTHQUAKE

—Almost unnoticeable. Felt by only a few people.  
Average number per year\*: several million (estimated)

## 3 MINOR EARTHQUAKE

—Vibrations similar to those of a passing truck.  
Avg. number per year\*: 130,000

## 4 LIGHT EARTHQUAKE

—Felt by nearly everyone. Unstable objects move.  
Avg. number per year\*: 13,000

## 5 MODERATE EARTHQUAKE

—Felt by everyone. Some damage to buildings.  
Avg. number per year\*: 1,319

## 6 STRONG EARTHQUAKE

—Damage to poorly constructed structures. Buildings shift off their foundations.  
Avg. number per year\*: 134

## 7 MAJOR EARTHQUAKE

—Few brick and stone buildings remain standing.  
Avg. number per year\*: 15

## 8+ GREAT EARTHQUAKE

—Widespread damage. Few structures remain standing.  
Avg. number per year\*: 1

\* WORLDWIDE  
SOURCE: U.S. GEOLOGICAL SURVEY

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